

SOCIB HF Radar system

Applications and validation

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Balearic Islands Coastal Observing and Forecasting System

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🐦 [@SOCIB_data](https://twitter.com/SOCIB_data)

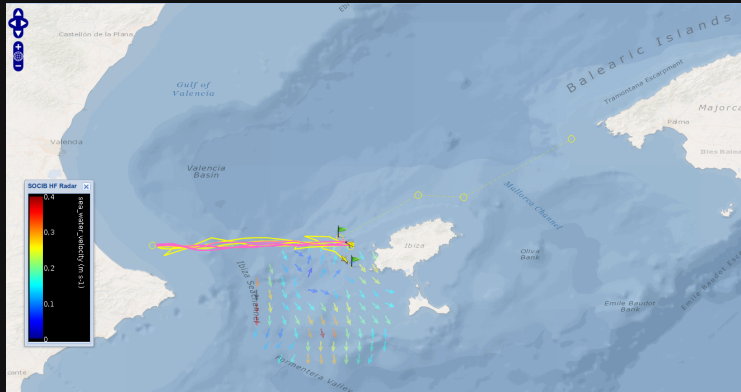


Context

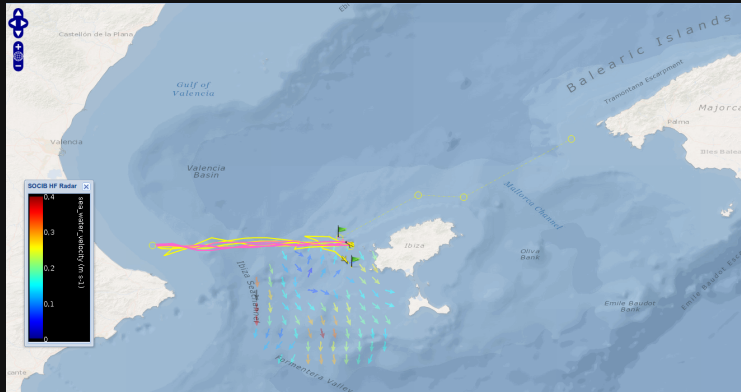
HF Radar **complements** the Coastal Ocean Observing and Forecasting System

The image is a screenshot of the SOCIB (Balearic Islands Coastal Observing and Forecasting System) website. The header features the SOCIB logo and navigation links: home, about us, facilities, news, multimedia, job opportunities, and competitive access. A large banner for a documentary titled "DOCUMENTARY: 'THE GLIDER REVOLUTION' BY THALASSA" is displayed, showing a yellow glider in the ocean. To the right, a "latest news" section lists three articles: "HCMR (Hellenic Centre for Marine Research) visit to SOCIB Glider Facility", "Surface circulation patterns in the Ibiza channel from HF Radar", and "SOCIB present at the 'Historias del Mediterráneo' open public talks at Caixa Fò". Below the banner and news section is a "facilities" row with icons for various equipment: COASTAL RESEARCH VESSEL, COASTAL HF RADAR (highlighted with a red circle), GLIDER, LAGRANGIAN PLATFORMS, FIXED STATIONS, BEACH MONITORING, OCEAN FORECAST, and DATA CENTER. The website also includes logos for the Spanish government and the Balearic Islands government.

Location: Ibiza Channel



Location: Ibiza Channel



See talk Wednesday at 15:15 by Emma Heslop: *"High sub-seasonal variability at circulation "choke" point in the Mediterranean"*

More details

Lana et al. (2014). SOCIB Continuous Observations Of Ibiza Channel Using HF Radar Technology for Characterization and Quantification of Surface Currents, *Sea Technology*. Accepted

SOCIB Continuous Observations Of Ibiza Channel Using HF Radar

Technology for Characterization and Quantification of Surface Currents

By Dr. Arancha Lana • Dr. Vicente Fernandez • Dr. Joaquín Tintoré

and SOCIB HF Radar Facility:

<http://socib.es/?seccion=observingFacilities&facility=radar>

Data access & visualisation

Characteristics

CODAR SeaSonde system
Two radial stations
with combined TX-RX antennas

TX center frequency: 13.5 Mhz

Bandwidth: 90 kHz

Grid resolution: 3 km

Averaging radius (radials): 6 km

Temporal resolution: hourly
(75 min moving average)

Temporal coverage: 1st June 2012
— ongoing



Data access: 2 clicks

HF Radar facility

The screenshot shows the SOCIB website interface. At the top, the SOCIB logo is followed by the text "Balearic Islands Coastal Observing and Forecasting System". To the right are logos for the Government of Spain, the Balearic Islands Government, and the Consell de les Illes Balears. Below this is a navigation bar with links: home, about us, facilities, news, multimedia, job opportunities, and competitive access. The "home" link is highlighted. The main content area features a large image of a research vessel and various oceanographic instruments. A yellow arrow points from the "HF Radar facility" text to the "COASTAL HF RADAR" icon in the "facilities" section. The "latest news" section on the right lists three articles. At the bottom, there are social media icons for Facebook, Twitter, LinkedIn, RSS, YouTube, and Flickr.

SOCIB Balearic Islands Coastal Observing and Forecasting System

GOVERNIO DE ESPAÑA GOVERN DE LES ILLES BALEARS Consell de les Illes Balears

home about us facilities news multimedia job opportunities competitive access

What is SOCIB

latest news

- SOCIB performed a drifter release exercise in the Ibiza Channel [06-10-2014]
- SOCIB featured in UNIDATA news [01-10-2014]
- SOCIB at 'Marginal Seas In Change' Workshop in Korea [29-09-2014]

facilities

- COASTAL RESEARCH VESSEL
- COASTAL HF RADAR
- GLIDER
- LAGRANGIAN PLATFORMS
- FIXED STATIONS
- BEACH MONITORING
- OCEAN FORECAST
- DATA CENTER

Data access: 2 clicks

- ▶ System description
- ▶ HF Radar facility
- ▶ Visualisation tool
- ▶ Access to data (thredds)

SOCIB HF Radar facility

The HF Radar facility provides real-time surface current data in the Ibiza Channel. If you are interested in the technical details of functioning of the HF Radar instrument, [read general information](#) or access to the [presentation at the HF Radar National Meeting](#).

In this map, the latest currents are represented (by its direction and speed value). All HF Radar Data has passed a battery of tests to ensure that the data being produced is of the highest quality and therefore, a QC flag can be displayed. Data can be downloaded in KML or GeoJSON format. For a wider and more complete functionality you use [Lw4nc2 application](#).

Active additional layers (velocity components, magnitude or QC status flags) using the layer controls located at the top right corner. Double click on any part of the map to get a time-series plot in that point for each one of the selected parameters.

Disclaimer

Lw4nc2 web client application

Lw4nc2 is a web based client application, developed by the **SOCIB Data Center**, intended to display gridded data from SOCIB, both, observational and forecasting.

- Browse the SOCIB HF Radar data by date and hour
- Animate layers
- Modify layer styles, color palette and scale boundaries
- Add markers to the map with the value of a parameter
- Get transect and timeseries plots

Data from

HF Radar

Download

Km2 (Today's info)

Data access

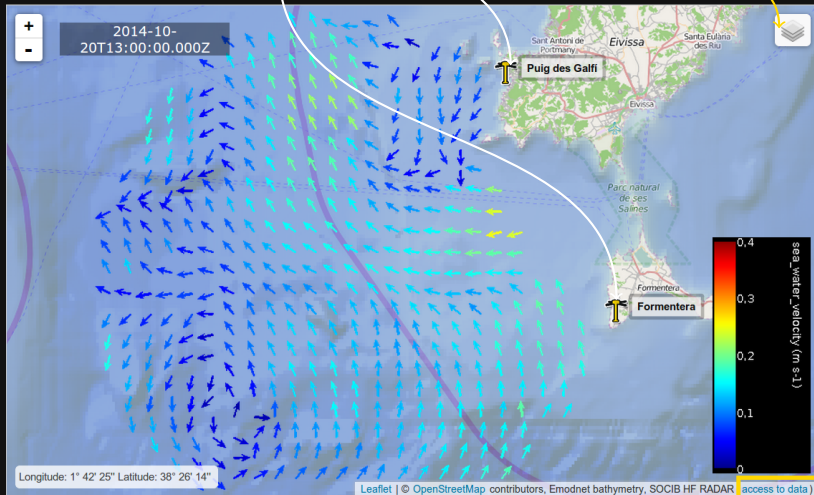
Threshold

OCIOBIB - IBERIAN RIVER

Data access: 2 clicks

Antennas FORM and GALF

Select layer



Direct data access

Data access: 2 clicks

Format: NetCDF CF-1.6 compliant

Coordinates: lon, lat, time

Variables: U, V, sea water speed

Quality flags: for each variable + for individual antennas

CODAR parameters: covariance,
signal-to-noise ratio,
radial vector count, ...

Quality control & validation

SOCIB Continuous Observations Of Ibiza Channel Using HF Radar

Technology for Characterization and Quantification of Surface Currents

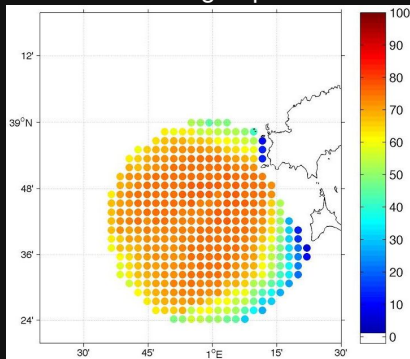
By Dr. Arancha Lana • Dr. Vicente Fernandez • Dr. Joaquín Tintoré

Automated QC procedure

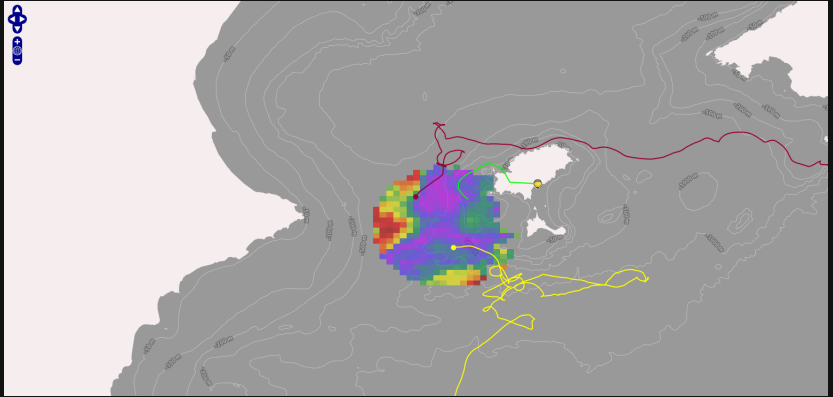
- ✓ CODAR QC procedures
- ✓ SOCIB Data Center procedures and flags for all radial and total data, based on:

1. System functioning diagnostic parameters at each radial station (signal-to-noise ratio, average radial bearing, radial vector count)
2. Battery of tests for individual total vector (range, gradient, spike)

Percentage of data flagged as *Good* at each grid point

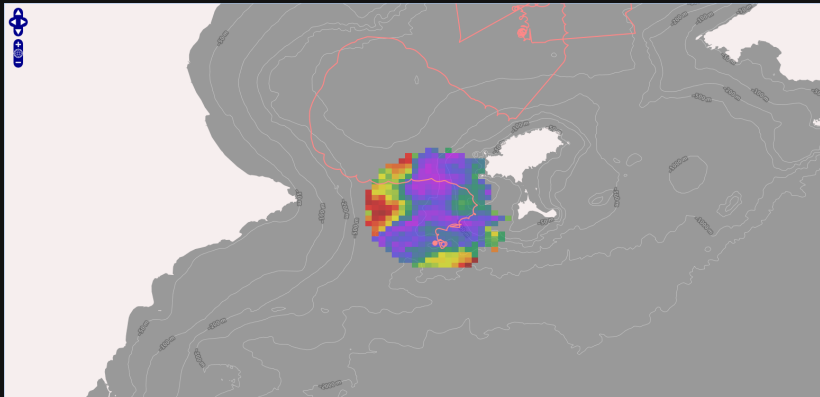


Validation experiments



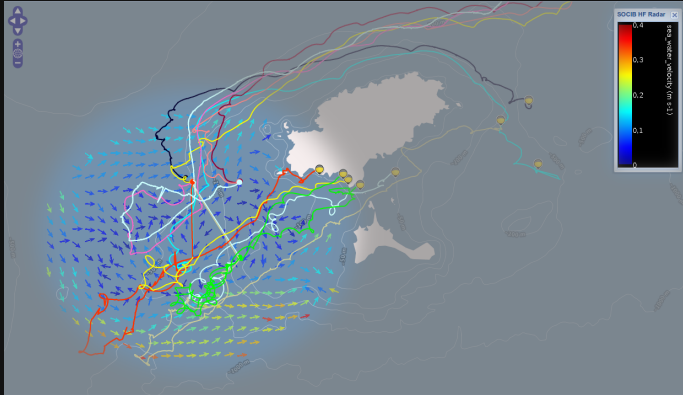
- TOSCA, October 2012: 3 drifters

Validation experiments



- ▶ TOSCA, October 2012: 3 drifters
- ▶ G-AltiKa, August 2013: 1 drifter + Glider + 40 Hz altimetry

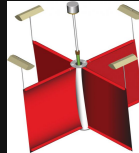
Validation experiments



- ▶ TOSCA, October 2012: 3 drifters
- ▶ G-AltiKa, August 2013: 1 drifter + Glider + 40 Hz altimetry
- ▶ Radar-Exp: September 2014: 13 drifters with different shapes and drogue types

Radar-Exp design

CODE-DAVIS (MetOcean)
Surface (1 m) current tracker
Low wind-exposure

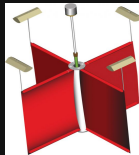


Radar-Exp design

CODE-DAVIS (MetOcean)

Surface (1 m) current tracker

Low wind-exposure



MD03i (Albatros)

Surface (1 m) current tracker

Low wind-exposure

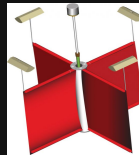


Radar-Exp design

CODE-DAVIS (MetOcean)

Surface (1 m) current tracker

Low wind-exposure



MD03i (Albatros)

Surface (1 m) current tracker

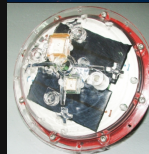
Low wind-exposure



ODi (Albatros)

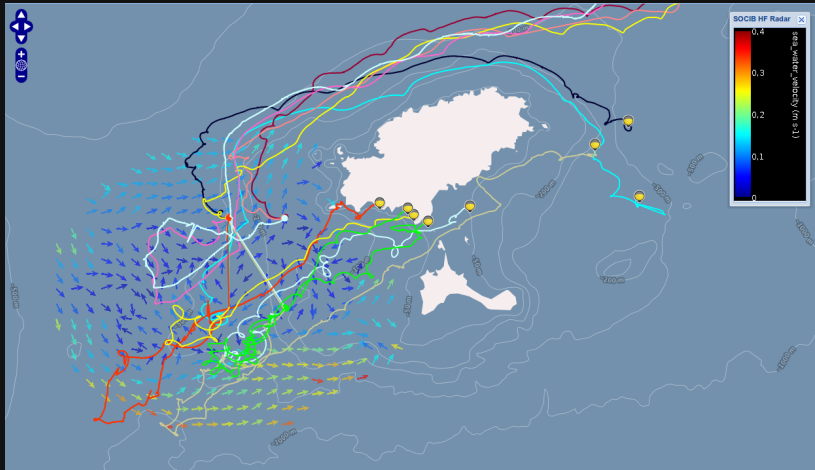
Surface current tracker

High wind-exposure



Radar-Exp design

3 types of drifters
at 4 different locations



Radar-Exp Results

Radial velocities interpolated at drifter positions

N = total number of position

GALF, FORM = radial stations

	N		Correlation coefficient (%)	
	GALF	FORM	GALF	FORM
CODE	611	566	73.3	60.9

Work in progress

Radar-Exp Results

Radial velocities interpolated at drifter positions

N = total number of position

GALF, FORM = radial stations

	N		Correlation coefficient (%)	
	GALF	FORM	GALF	FORM
CODE	611	566	73.3	60.9
MD03i	971	876	68.8	75.3

Work in progress

Radar-Exp Results

Radial velocities interpolated at drifter positions

N = total number of position

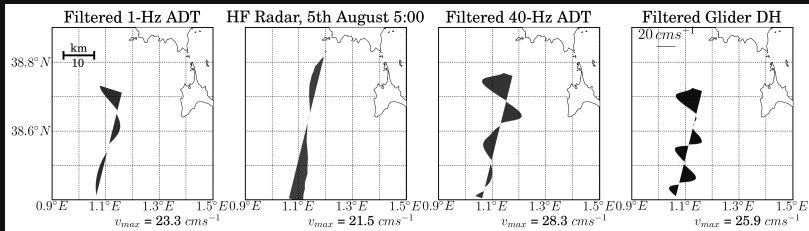
GALF, FORM = radial stations

	N		Correlation coefficient (%)	
	GALF	FORM	GALF	FORM
CODE	611	566	73.3	60.9
MD03i	971	876	68.8	75.3
ODi	697	446	74.3	64.4

Work in progress

Scientific
results

Multi-platform experiment

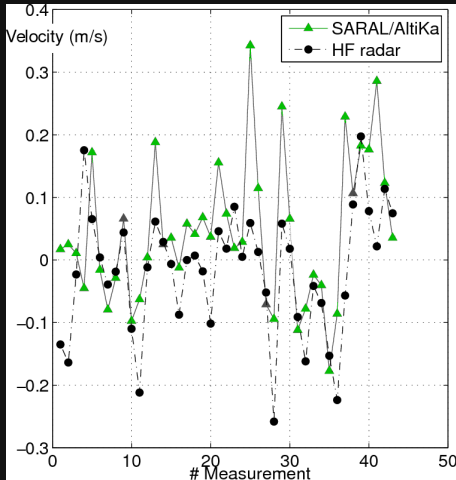


- ▶ Radar velocity closest to coast
- ▶ Northwestward current: approx. 20 cm/s
- ▶ Shown by three platforms

Troupin et al. (2014). Illustration of the emerging capabilities of SARAL/AltiKa in the coastal zone using a multi-platform approach, *Advances in Space Research*.

doi: [doi:10.1016/j.asr.2014.09.011](https://doi.org/10.1016/j.asr.2014.09.011)

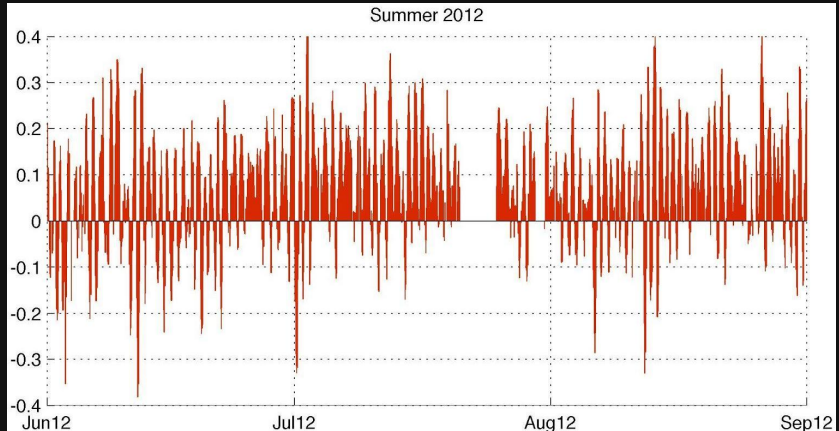
Comparison with recent SARAL/AltiKa altimeter



- Good agreement between HF radar and SARAL/AltiKa velocity (significant correlations above 70%)

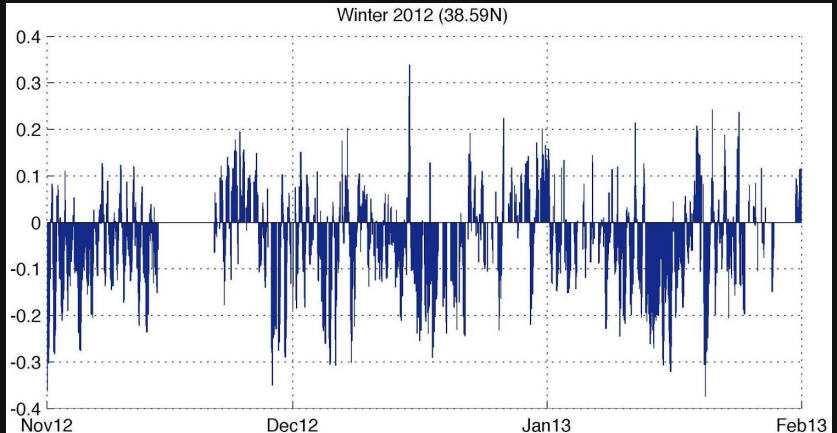
Pascual et al. (2014). Assessing SARAL/AltiKa near-real time data in the coastal zone: comparisons with HF radar and Jason-2 observations. *Marine Geodesy*. Under review.

Meridional transport in the Ibiza Channel



Summer: dominant northward current

Meridional transport in the Ibiza Channel

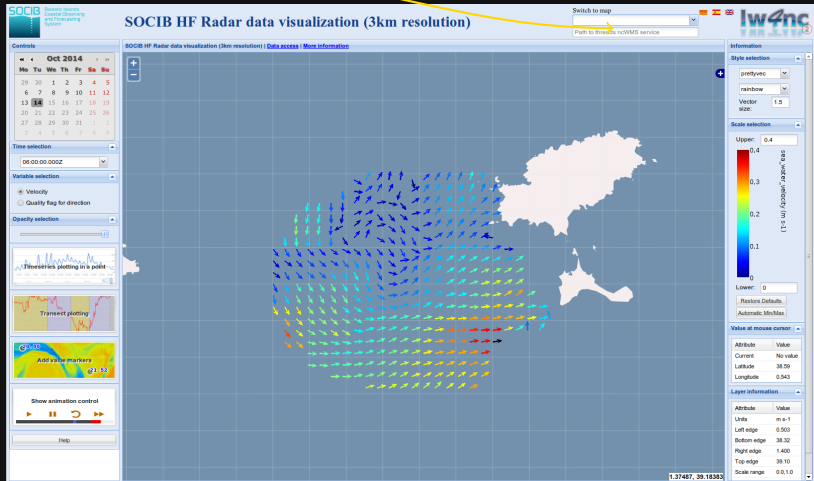


Winter: southward current, weaker

Web-based Applications

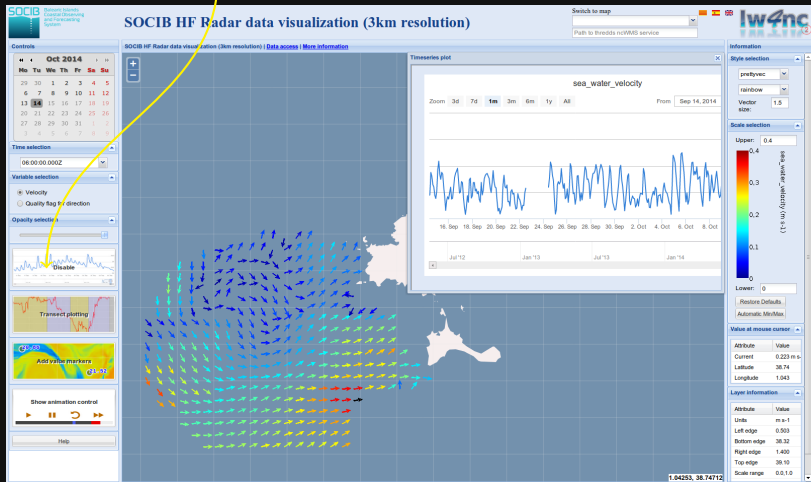
Lightweight NetCDF viewer

Select data source



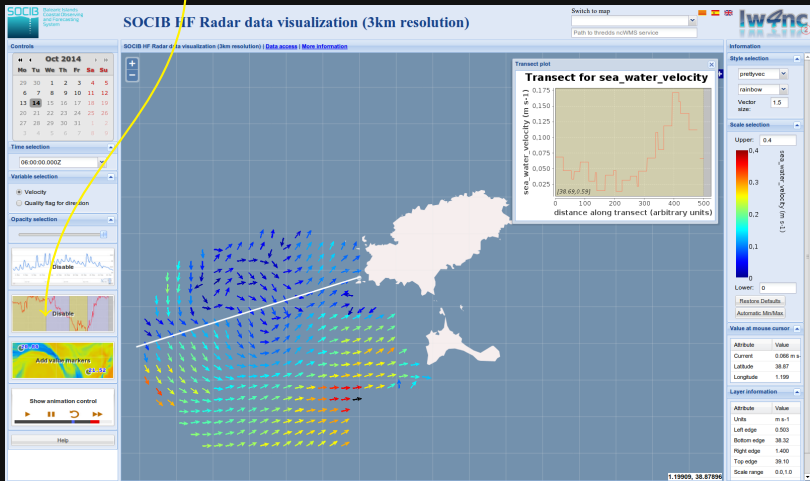
Lightweight NetCDF viewer

Extract time series

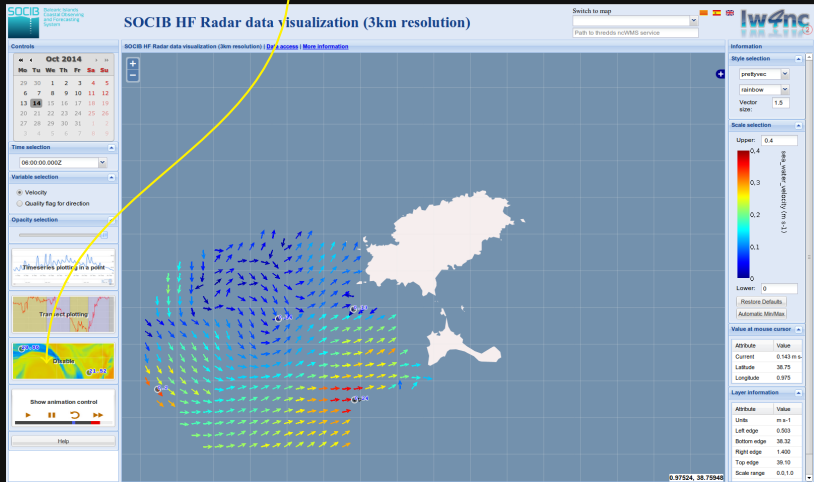


Lightweight NetCDF viewer

Extract transect

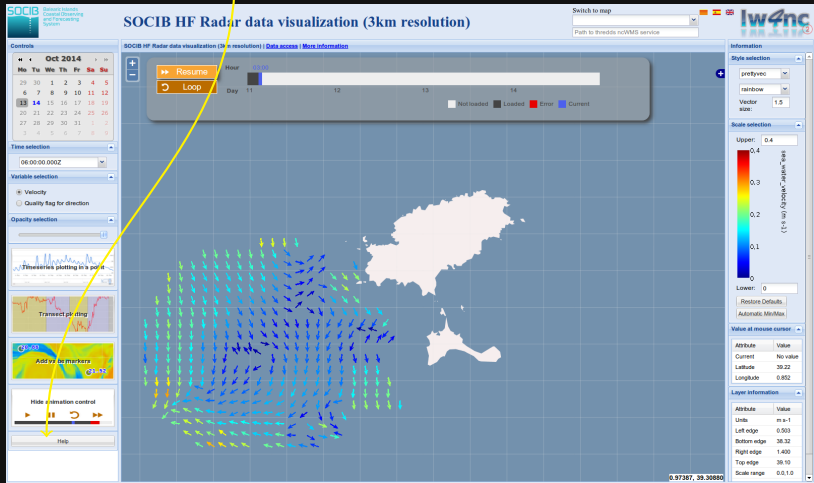


Extract values at markers



Lightweight NetCDF viewer

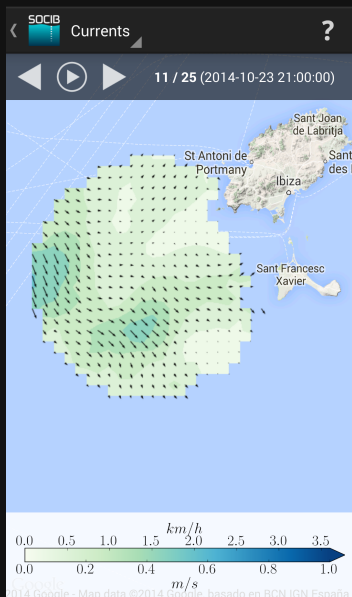
Generate animation



Smart-phone app



Smart-phone app



Messages

- ✉ HF radar as a component of a multi-platform system
- ✉ Quality control: strive for standard procedures, flags, criteria, . . .
- ✉ relevant scientific results
- ✉ Validation: dedicated experiments
- ✉ Efficient visualisation tools and apps

Future work

Validation using oceanographic buoy in Ibiza Channel

Comparison with ocean forecast model

Assimilation of radar velocities in forecast model

Increase number of users non-scientists

Thanks for your attention

✉ data.centre@socib.es

🐦 @SOCIB_data